



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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**OPP OFFICIAL RECORD
HEALTH EFFECTS DIVISION
SCIENTIFIC DATA REVIEWS
EPA SERIES 361**

**OFFICE OF
CHEMICAL SAFETY
AND POLLUTION PREVENTION**

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SUBJECT: Difenoconazole: Occupational and Residential Exposure Assessment for the Proposed New Use of Difenoconazole on Proposed New Uses of Difenoconazole on Strawberry, Carrot, Chickpeas, Soybean, Stone Fruit: Group 12 and Golf Course Turfgrass

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Risk Assessment Type: Single Chemical Aggregate

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DP Barcode: 371037

Registration No.: 100-1262, 100-1312,
100-1313, 100-1317

Regulatory Action: Section 3 Registration

Case No.: 7014

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This document provides the Health Effects Division's (HED's) occupational and residential exposure assessment for proposed new uses of difenoconazole on strawberry, carrot, chickpeas, soybean, stone fruit and golf course turf. This document also updates previous residential and occupational exposure assessments on existing uses to incorporate a new dermal absorption factor and updated residential and occupational scenarios.

*Revised in PAC
3/1/2011
ear*

1.0 Executive Summary

1.1 Background and Purpose

This document assesses proposed new uses of difenoconazole and revises previous occupational and residential exposure assessments for existing uses of difenoconazole to incorporate new dermal exposure data and update occupational and residential exposure scenarios. Difenoconazole is a broad spectrum fungicide belonging to the triazole group of fungicides. It is currently registered in the U.S. for use as a seed treatment and for foliar applications to food commodities and ornamentals. Difenoconazole is available as liquid emulsifiable concentrate, flowable concentrate, and ready-to-use formulations. Difenoconazole is applied to field and vegetable crops and landscape ornamentals by commercial applicators using aerial and ground application methods and equipment. It is applied to ornamentals by residential applicators using hand held sprayers.

1.2 Proposed New Uses

Syngenta Crop Protection Inc., is requesting amended registration for a 1.05 lb ai/gal soluble concentrate (SC) formulation of difenoconazole and azoxystrobin Quadris Top® Fungicide (EPA Reg No 100-1313) to add a golf course turf use and an alternative brand name, Heritage Top® for the golf course use product. The proposed maximum application rate is 0.25 lbs active ingredient (ai) per acre with a reapplication interval of 14-21 days and a maximum seasonal use rate of 0.52 lbs ai per acre per year. The Quadris label includes a restricted entry interval of 12 hours to fields planted with treated seed.

Syngenta is also requesting an amended registration for a 2.08 lb/gal emulsifiable concentrate (EC) formulation (Inspire™ Fungicide; 100-1262) to add uses on carrots, chickpeas, soybeans, stone fruits, and strawberries. In addition, Syngenta is proposing to add some or all of these proposed food uses to the following multiple active ingredient products: a 2.08 lb/gal MAI EC formulation with propiconazole (Inspire™ XT Fungicide; EPA Reg. No. 100-1312); a 1.05 lb/gal MAI suspension concentrate (SC) formulation with azoxystrobin (Quadris Top™ Fungicide; EPA Reg. No. 100-1313); and a 0.73 lb/gal MAI emulsion oil in water (EW) formulation with cyprodinil (Inspire Super™ Fungicide; EPA Reg. No. 100-1317). The EC product formulations (EPA Reg. Nos. 100-1262 and 100-1312) are proposed for multiple foliar applications at 0.09-0.114 lb ai/A/application for maximum seasonal rates of 0.46 lb ai/A on carrots, chickpeas (EPA Reg. No. 100-1262 but not EPA Reg. No. 100-1312), soybeans, stone fruits, and strawberries.

1.3 Existing Uses

Difenoconazole is currently registered in the U.S. for use as a seed treatment on cereal grains, canola, and cotton and for foliar applications to numerous fruit and vegetable commodities and ornamentals. As a seed treatment, it is applied with commercial grade seed treatment equipment. Difenoconazole is applied to field and vegetable crops and landscape ornamentals by commercial and residential applicators using aerial and ground application

methods and equipment. In accordance with the Worker Protection Standard (WPS), a 12-hr restricted entry interval (REI) is required for difenoconazole uses.

1.4 Hazard Profile and Toxicological Endpoint Selection

Difenoconazole exhibits low acute toxicity by the oral, dermal and inhalation routes of exposure. It is not an eye or skin irritant and is not a sensitizer. Subchronic and chronic studies in rats and mice show cumulative decreases in body weight gains. Difenoconazole is not considered to be neurotoxic based on available data. It is not a developmental or reproductive toxicant. Chronic effects in rats and mice are seen as cumulative decreases in body weight gains. HED's Cancer Peer Review Committee (CPRC) recommended for a cancer classification of C (possible human carcinogen) and use of a margin-of-exposure (MOE) approach to risk assessment.

Toxicological points of departure (PODs) were selected for occupational and residential exposure via dermal, inhalation exposure pathways. Exposure periods are expected to be short and intermediate-term based on label prescribed uses. Short and intermediate-term dermal and inhalation PODs were selected from a rat reproduction study based on body weight effects. A dermal absorption factor is applied when dermal exposure endpoints are selected from oral toxicity studies. The dermal factor converts the oral dose to an equivalent dermal dose for the risk assessment. A dermal absorption factor of 6% was used for the dermal exposure assessment. This factor was derived based on data from a triple pack of a 28 rat *in vivo* dermal absorption study and *in vitro* dermal absorption studies conducted with rat and human skin. Inhalation toxicity is assumed to be equivalent to oral toxicity. The level of concern (LOC) or target margin of exposure (MOE) for difenoconazole for occupational and residential exposure is 100 (10x for interspecies extrapolation, 10x for intraspecies variation). MOEs below this level (<100) represent a risk concern for the Agency.

1.4 Exposure/Risk Assessment and Risk Characterization

The exposure assessment addresses risks from worker and residential handler and post-application scenarios for existing uses and for proposed new uses of difenoconazole on strawberry, carrot, chickpeas, soybean, stone fruit and golf course turf. Based on this analysis, the proposed new product does not present residential or worker risks of concern.

2.0 Hazard Identification

2.1 Acute Toxicology Categories

The acute toxicity profile for difenoconazole is provided in Table 1.

Table 1. Acute Toxicity Profile – Difenconazole				
Guideline No.	Study Type	MRID No.	Results	Toxicity Category
870.1100	Acute oral	42090006	LD ₅₀ = 1450 mg/kg	III
870.1200	Acute dermal	42090007	LD ₅₀ > 2010 mg/kg	III
870.1300	Acute inhalation	42090008	LC ₅₀ > 3.3 mg/L	III
870.2400	Eye irritation	42090009	Mild irritation reversible in 7 days	III
870.2500	Dermal irritation	40789807	Slight irritation	IV
870.2600	Skin sensitization	42090011, 42710004	Negative	N/A

2.2 Toxicological Endpoints for Risk Assessment

HED identified toxicological endpoints of concern for occupational and residential exposure pathways for difenconazole. All risk estimates are based on the most current toxicity information available. The endpoints and MOEs that were used to complete this assessment are summarized in Table 2.

Table 2. Summary of Toxicological Doses and Endpoints for Difenconazole for Use in Dietary and Non-Occupational Human Health Risk Assessments				
Exposure Scenario	Point of Departure	Uncertainty/FQPA Safety Factors	RfD, PAD, Level of Concern for Risk Assessment	Study and Toxicological Effects
Dermal Short- and Intermediate- Term (1-30 days and 1-6 months) DAF = 6%	Oral NOAEL = 1.25 mg/kg/day	UF _A = 10X UF _H = 10X	Occupational LOC for MOE<100	Reproduction and fertility Study (rat; dietary) Parental/Offspring LOAEL = 12.5 mg/kg/day based on decreased pup weight in males on day 21 and reduction in body-weight gain of F ₀ females prior to mating, gestation and lactation.
Inhalation (Short- and Intermediate-term) Inhalation and oral absorption assumed equivalent	Oral NOAEL = 1.25 mg/kg/day	UF _A = 10X UF _H = 10X	Occupational LOC for MOE<100	Reproduction and fertility Study (rat; dietary) Parental/Offspring LOAEL = 12.5 mg/kg/day based on decreased pup weight in males on day 21 and reduction in body-weight gain of F ₀ females prior to mating, gestation and lactation.
Cancer (oral, dermal, inhalation)	Difenconazole is classified "Suggestive Evidence of Carcinogenic Potential" with a non-linear (MOE) approach for human risk characterization (CPRC Document, 7/27/94, Memo, P. V. Shah dated March 3, 2007, HED Doc. No. 0054532).			

NOAEL = no observed adverse effect level LOAEL = lowest observed adverse effect level MOE = margin of exposure
LOC = level of concern. DAF = dermal absorption factor

3.0 Use Pattern and Application Rates

Difenconazole is a broad spectrum fungicide currently registered in the U.S. for use as a seed treatment on cereal grains, canola, and cotton and for foliar applications to pome fruits, sugar beets, fruiting vegetables, tree nuts, tuberous and corm vegetables and ornamentals. Maximum application rates for existing and proposed new uses are provided in Table 3. Maximum rates are based on a review of active labels.

Table 3. Maximum Application Rates for Difenoconazole Existing and Proposed Uses				
Application Site	Reg No.	Max Single App Rate	App Method	App Timing
Existing Uses				
Citrus ¹	100-1262	0.125 lb ai/A	aerial, ground, chemigation	post bloom
Ornamentals	23.2% ai EC ²	0.13 lb ai/A	aerial, ground, chemigation	
Seed Treatment	100-740 32.8% ai SC ³	1.23 oz/100 lb seed	commercial treatment	pre-plant
Proposed New Uses				
Golf Course Turf	100-1313 11.4% ai SC	0.25 lb ai/A	ground	post bloom
Strawberry, Carrot, Chickpeas, Soybean, Stone Fruit	100-1262 23.2% ai EC	0.114 lb ai/A	aerial, ground, chemigation	post bloom

¹Maximum application rates are lower for all other registered tree fruit uses (i.e., 0.114 lb ai/A)

² EC – Emulsifiable Concentrate

³ SC – Soluble Concentrate

4.0 OCCUPATIONAL EXPOSURE AND RISK

Occupational handler and post-application exposure scenarios are assessed for proposed new uses on strawberry, carrot, chickpeas, soybean, stone fruit, and turf and existing uses on fruit and nut commodities and ornamentals. Based on the product labels and information provided by the registrant, short- and intermediate-term exposures are assessed for occupational handlers and post-application activities. Dermal and inhalation exposures to workers are aggregated for difenoconazole because the toxicity endpoints for these exposure routes are based on common toxicological effects.

4.1 Occupational Handler Exposure

The term “handler” applies to individuals who mix, load, and apply the pesticide product. There is a potential for exposure to difenoconazole during mixing, loading, and application activities through the dermal and inhalation routes. Difenoconazole products are applied using aerial, groundboom, chemigation and handheld sprayers.

4.1.1 Occupational Handler Exposure Scenarios

The following handler exposure scenarios evaluated for this assessment are based on information provided in the proposed and existing labels.

4.1.1.1 Foliar Spray

- Open mixing/loading liquid formulation for groundboom, aerial, chemigation, and airblast application to food crops.
- Open mixing/loading/applying with groundboom, LCO Handgun, high pressure handwand, low pressure handwand, backpack sprayer equipment to ornamentals and turf

- Applying with aerial, groundboom, airblast sprayer equipment to food crops and/or ornamentals
- Flagging for aerial application to food crops

4.1.1.2 Seed Treatment

- Loading/Applying - Flowable concentrate for Seed treatment applications (single layer clothing with gloves).
- Sewing - Flowable concentrate for Seed treatment applications (single layer clothing with no gloves/ "Baseline").
- Bagging - Flowable concentrate for Seed treatment applications (single layer clothing with no gloves/ "Baseline").
- Multiple Activities - Flowable concentrate for Seed treatment applications (single layer clothing with gloves).

4.1.2 Occupational Handler Exposure Data

No chemical-specific handler exposure data were submitted in support of this registration. When chemical-specific monitoring data are not available, it is HEDs policy to use data from the Pesticide Handlers Exposure Database (PHED) Version 1.1 as presented in PHED Surrogate Exposure Guide (8/98) to assess handler exposures for regulatory actions (HED Science Advisory Council for Exposure Standard Operating Procedure #7, dated 1/28/99). Handler exposure scenarios for seed treatment are based on information provided in the Science Advisory Council for Exposure (Expo SAC) Standard Operating Procedures for Seed Treatment (SOP No. 14) dated May 1, 2003 and ExpoSAC SOP No. 15, Amount of Seed Treated or Planted Per Day dated March 2, 2004.

4.1.4 Occupational Handler Exposure Assumptions

- Average body weight of an adult handler is 70 kg.
- Dermal Absorption Factor = 6%
- Exposure duration is short-term (1- 30 days) and intermediate-term (1-6 months)
- Maximum label application rates:
 - 0.125 lb ai/A for citrus
 - 0.114 lb ai A for soybean
 - 0.13 lb ai/A; 2.08 lb ai/gal for ornamentals
 - 0.25 lb ai/A; 1.05 lb ai/gal for golf course turf
 - 0.025 lb ai/100 lb seed for barley and sweet corn seed
 - 0.0305 lb ai/100 lb seed for cotton seed
- Area treated:
 - 1200 acres per day for aerial application to soy bean crop
 - 350 acres per day for aerial application to fruit and nut crop
 - 80 acres per day for groundboom application to fruit and nut crop
 - 40 acres per day for groundboom application to golf course turf and airblast for citrus

- 100 acres per day for LCO handgun applications to golf course turf [Note: 100 acres for the LCO handgun represents an individual mixing a loading 20 trucks that will apply 5 acres each]
- 80 acres per day for groundboom application (sweet corn)
- 5 acres per day for handheld spray sprayer applications to golf course turf
- Amount of seed treated:
 - 718000 lbs/day for barley
 - 194000 lbs/day for sweet corn
 - 160000 lbs/day for cotton

4.1.4 Occupational Handler Exposure and Risk

Exposure and risk estimates indicate risks are not of concern for occupational handler activities for the existing and proposed new uses (i.e., MOEs > 100). A summary of occupational handler exposure and risk calculations, assumptions, and results is provided in Tables 4, 5 and 6.

Table 4. Estimated Exposure & MOEs for Short- and Intermediate-Term Occupational Handler - Exposure Existing Uses of Difenconazole on Crops and Ornamentals LOC/MOE = 100

Exposure Scenario	Unit Exposure ¹			Appl Rate (lb ai/A or Gal) ²	Area Treated (A/ or Gal/day) ³	Crop	ST & IT Dose (mg/kg/day) ⁴			ST & IT MOEs			Agg dose (mg/kg/day)		Agg MOE ⁵	
	Inhal (ug/lb ai)	Dermal					Dermal		Inhal	Dermal		Inhal	BL	BL + Glove	BL	BL + Glove
		BL	BL + Glove													
		(mg/lb ai)					BL	BL + Glove		BL	BL+ Glove					
Mixing/Loading - Liquid																
groundboom	1.2	2.9	0.023	0.125	80	citrus	0.0002	0.0249	0.0002	50	6300	7300	0.0250	0.0004	50	3400
aerial chemigation	1.2	2.9	0.023	0.125	350	citrus	0.0008	0.1088	0.0009	10	1450	1700	0.1095	0.0016	11	800
aerial application	1.2	2.9	0.023	0.114	1200	soy bean	0.0023	0.3400	0.0027	5	500	500	0.3424	0.0050	4	250
airblast	1.2	2.9	0.023	0.125	40	citrus	0.0001	0.0124	0.0001	100	13000	15000	0.0125	0.0002	100	6800
Applying Liquid																
groundboom	0.74	0.014	NA	0.125	80	citrus	0.0001	0.0001	NA	10417	NA	11800	0.0002	NA	5538	NA
aerial	0.07	0.005	NA	0.125	350	citrus	0.0000	0.0002	NA	6667	NA	29000	0.0002	NA	5435	NA
airblast	4.5	0.36	0.24	0.125	40	citrus	0.0003	0.0015	0.0010	810	1200	4000	0.0019	0.0014	670	1000
Flagging																
aerial	0.35	0.011	0.012	0.125	350	soy	0.0005	0.0004	0.0002	3030	2800	5700	0.0007	0.0006	1980	1900
Mixing/Loading/Applying - Liquid																
groundboom	1.3	0.37	0.057	0.13	40	Ornamentals	0.0001	0.0016	0.0003	758	4900	13000	0.0017	0.0004	716	3600
LCO handgun	1.8	NA	0.45	0.13	5		0.0000	NA	0.0003	NA	5000	75000	NA	0.0003	NA	4700
low pressure handwand	30	100	0.43	0.003	40 G		0.0103	0.0000	0.0001	122	28000	24000	0.0130	0.0001	121	13000
backpack sprayer	30	NA	2.5	0.003	40 G		NA	0.0003	0.0001	NA	5000	24000	NA	0.0003	NA	4100

¹ Baseline (BL) and personal protective equipment (PPE) unit exposure values are reported in the PHED Surrogate Exposure Guide dated August 1998: Groundboom and aerial mixer/loader unit exposures are the same for baseline PPE and Gloves

² Application rates based on labels .

³ Amount treated based on information provided ExpoSAC Policy 9

⁴ Dermal dose (mg/kg/event) = [unit dermal exposure (mg/lb ai) * application rate (lb ai/A) * Amount treated*DAF / body weight (70 kg)].

⁴ Inhalation dose (mg/kg/event) = [unit exposure (kg/lb ai) * (1mg/1000 kg) conversion * appl. rate (lb ai/lbs seed) * Amount treated / body weight (70 kg)].

⁵ Agg MOE = 1/(1/Dermal MOE + 1/Inhalation MOE).

Table 5. Estimated Exposure & MOEs for Short- and Intermediate-Term Occupational Handler Exposure – Existing Use of Difenconazole for Seed Treatment Dermal and Inhalation LOC/MOE = 100

PPE ¹	Inhal Unit Exposure (ug/lb ai) ²	Dermal Unit Exposure (mg/lb ai) ³	Crop	App Rate (lb ai/lb seed) ⁴	Amt Treated (lb seed/day) ⁵	Inhal Dose (mg/kg/d) ⁶	Inhal MOE	Dermal Dose ⁷	Derm MOE	Agg dose ⁸	Agg MOE ⁹
Loader/Applicator											
Single layer gloves	0.34	0.023	barley	0.000244	718000	0.00099	10100	0.00345	2900	0.00445	280
Single layer gloves	0.34	0.023	Sweet Corn	0.000244	194000	0.00027	37300	0.00093	10700	0.00120	1000
Single layer gloves	0.34	0.023	cotton	0.000305	160000	0.00028	36100	0.00096	10400	0.00124	1000
Sewer											
Single layer gloves	0.23	0.0062	barley	0.000244	718000	0.00067	14900	0.00093	10700	0.00160	780
Single layer gloves	0.23	0.0062	Sweet Corn	0.000244	194000	0.00018	55100	0.00025	40000	0.00043	2900
Single layer gloves	0.23	0.0062	cotton	0.000305	160000	0.00019	53500	0.00026	39000	0.00045	2800
Bagger											
Single layer no gloves	0.16	0.0091	barley	0.000244	718000	0.00047	21400	0.00137	7300	0.00183	680
Single layer no gloves	0.16	0.0091	Sweet Corn	0.000244	194000	0.00013	79200	0.00037	27000	0.00050	2500
Single layer no gloves	0.16	0.0091	cotton	0.000305	160000	0.00013	76800	0.00038	26000	0.00051	2500
Multiple Activities											
Single layer no gloves	1.6	0.042	barley	0.000244	718000	0.00467	2100	0.00631	1600	0.01098	900
Single layer no gloves	1.6	0.042	Sweet Corn	0.000244	194000	0.00126	7900	0.00170	5900	0.00297	3400
Single layer no gloves	1.6	0.042	cotton	0.000305	160000	0.00130	7700	0.00176	5700	0.00306	3300
Planting											
Single layer gloves	3.4	0.25	barley	0.000244	718000	0.00993	1000	0.03754	270	0.04747	200
Single layer gloves	3.4	0.25	Sweet Corn	0.000244	194000	0.00268	3700	0.01014	990	0.01283	780
Single layer gloves	3.4	0.25	cotton	0.000305	160000	0.00277	3600	0.01046	960	0.01322	760

¹ PPE (Personal Protection Equipment)

² Inhalation Exposure is based on a Baseline exposure scenario (no respiratory protection).

³ Dermal Unit Exposure is characterized with existing table.

⁴ Application rates are based on label specific information

⁵ Amount/Seed treated values are based on ExpoSAC SOP

⁶ Inhalation dose (mg/kg/event) = [unit exposure (kg/lb ai) * (1mg/1000 kg) conversion * appl. rate (lb ai/lbs seed) * Amount treated / body weight (60 kg)].

⁷ Dermal dose (mg/kg/event) = [unit dermal exposure (mg/lb ai) * dermal absorption (0.6) * application rate (lb ai/lb seed) * Amount treated / body weight (60 kg)].

⁸ Agg does = dermal dose + inhalation dose.

⁹ Agg MOE = NOAEL (1.25 mg/kg/d) / combined inhalation and dermal dose. MOE = 100.

¹⁰ Gloves used for loading only.

Table 6. Estimated Exposure & MOEs for Short- and Intermediate-Term Occupational Handler Exposure - New Uses of Difenconazole on Golf Course Turf LOC/MOE = 100

Exposure Scenario	Unit Exposure ¹			Appl Rate (lb ai/A or Gal) ²	Area Treated (A/ or Gal/day) ³	Crop	ST & IT Dose (mg/kg/day) ⁴			ST & IT MOEs			Agg dose (mg/kg/day)		Agg MOE ⁵	
	Inhal (ug/lb ai)	Dermal					Dermal		Inhal	Dermal		Inhal	BL	BL + Glove	BL	BL + Glove
		BL	BL + Glove													
		(mg/lb ai)					Glove			Glove						
Mixing/Loading - Liquid																
groundboom	1.2	2.9	0.023	0.25	40	turf	0.0249	0.0002	0.0002	50	6300	7300	0.0250	0.0004	50	3400
LCO Handgun	0.74	2.9	0.23	0.25	100		0.0621	0.0005	0.0003	20	250	4700	0.0624	0.0008	20	1700
Applying Liquid																
groundboom	0.74	0.014	NA	0.25	40	turf	0.0001	NA	0.0001	10400	NA	11800	10417	NA	5500	NA
LCO Handgun	1.4	NA	0.34	0.25	5		NA	0.0004	0.0000	NA	3400	50000	NA	0.0004	NA	3200
Mixing/Loading/Applying - Liquid																
groundboom	1.3	0.37	0.057	0.25	40	turf	0.0032	0.0005	0.0002	390	2600	6700	0.0034	0.0007	370	1900
LCO handgun	1.8	NA	0.45	0.25	5		0.0005	NA	0.0003	NA	2600	39000	NA	0.0005	NA	2400
low pressure handwand	30	100	0.43	0.006	40 G		0.0206	0.0001	0.0001	61	14000	12500	0.0207	0.0002	60	6500
Backpack Sprayer	30	NA	2.5	0.006	40 G		0.0180	NA	0.0005	NA	2400	12200	NA	0.0006	NA	2000

¹ Baseline and PPE (glove) unit exposure values are reported in the PHED Surrogate Exposure Guide dated August 1998: Groundboom and aerial mixer/loader unit exposures are the same for baseline PPE and Gloves

² Application rates based on labels

³ Amount treated based on information provided ExpoSAC Policy 9

⁴ Dermal dose (mg/kg/event) = [unit dermal exposure (mg/lb ai) * application rate (lb ai/A) * Amount treated / body weight (70 kg)].

⁴ Inhalation dose (mg/kg/event) = [unit exposure (kg/lb ai) * (1mg/1000 kg) conversion * appl. rate (lb ai/lbs seed) * Amount treated / body weight (70 kg)].

⁵ Agg MOE = 1/(1/Dermal MOE + 1/Inhalation MOE).

4.2 Occupational Post-Application Exposure

HED uses the term “post-application” to describe those individuals who can be exposed to pesticides after entering areas previously treated with pesticides and performing certain tasks or activities (also often referred to as reentry exposure). The specific activity, the nature of the crop or target that was treated, and the how chemical residues degrade in the environment can cause exposure levels to differ over time. Each of these factors is considered in the post-application exposure assessment. Difenconazole is applied post-bloom.

Post-application exposures are expected to occur primarily via the dermal route. Based on the Agency's current practices, a quantitative post application inhalation exposure assessment was not performed for difenconazole. However, volatilization of pesticides may be a potential source of post application inhalation exposure to individuals nearby to pesticide applications. The Agency sought expert advice and input on issues related to volatilization of pesticides from its Federal Insecticide, Fungicide, and Rodenticide Act Scientific Advisory Panel (SAP) in December 2009. The Agency received the SAP's final report on March 2, 2010 and is in the process of evaluating the SAP report. The Agency may, as appropriate, develop policies and procedures to identify the need for and, subsequently, the way to incorporate post application inhalation exposure into the Agency's risk assessments. If new policies or procedures are put

into place, the Agency may revisit the need for a quantitative post application inhalation exposure assessment.

4.2.1 Occupational Post-Application Exposure Scenarios

There are no compound specific data with which to estimate post-application exposures to agricultural workers. Estimates of post-application re-entry exposure to agricultural workers are based upon the EXPOSAC Standard Operating Procedures (SOPs) (3.1, Reference 4). This SOP lists a number of possible post-application agricultural activities for the proposed crop uses that might result in post-application.

The following post-application exposure scenarios were assessed for proposed post-emergence uses of difenoconazole.

- Deciduous Trees; thinning, harvesting, pruning, training, tying
- Tree Nuts; harvesting/poling, pruning, thinning
- Root Vegetables; hand harvesting
- Cucurbit Vegetables; hand harvesting, pulling, leaf thinning, thinning, turning
- Fruiting Vegetables; hand harvesting, pruning, staking, tying
- Brassica; hand harvesting, irrigation, pruning, topping, tying mature plants
- Leafy Vegetables; hand harvesting, pruning, and thinning mature plants
- Vine/Trelis Crops (Grapes); hand harvest, leaf pulling, thinning, pruning, training/tying grapes
- Low/Medium Height Field Row Crops (Soybean); hand harvesting

In accordance with the Worker Protection Standard (WPS), a 12-hr restricted entry interval (REI) is required for chemicals classified under Toxicity Category III/IV.

4.2.3 Occupational Post-application Exposure Data

No chemical-specific handler exposure data were submitted in support of this registration. Therefore, agricultural transfer coefficients used for this assessment are taken from HED's Science Advisory Council for Exposure Policy on Agricultural Transfer Coefficients (SOP # 003.1, 8/7/00).

4.2.4 Occupational Post Application Exposure Assumptions

- Average body weight of an adult handler is 70 kg.
- Dermal Absorption Factor = 6%
- Exposure duration:
 - short-term (1- 30 days)
- Maximum label application rates:
 - 0.125 lb ai/A for citrus
 - 0.114 lb ai /A for all other existing and proposed uses on food crops
 - 0.025 lb ai/a for golf course turf

- Transfer Coefficients:
 - 3000 cm²/hour for thinning deciduous tree crop
 - 2500 cm²/hour for
 - harvesting, poling, pruning, thinning tree nut crop
 - hand harvesting root vegetable crop
 - hand harvesting, pulling, leaf thinning, thinning, turning cucurbit vegetable crop
 - hand harvesting, pruning, and thinning mature leafy vegetable plants
 - hand harvesting soybean crop
 - 1000 cm²/hour for hand harvesting, pruning, staking, tying fruiting vegetable crop
 - 5000 cm²/hour for hand harvest, leaf pulling, thinning, pruning, training/tying grapes
- Initial fraction of ai retained on foliage is 20%
- Exposure is assumed to occur on the day of application (day 0)

4.2.5 Occupational Post-Application Exposure and Risk Estimates

Exposure estimates indicate that post-application risks are not of concern (MOEs > 100). A summary of post-application exposure and risk calculations, assumptions, and results is provided in Table 7.

Exposure Scenario	Activity	App Rate (lb ai/A) 1	TTR/DFR (mg/cm ²) ²	TC (cm ² /hr) 3	Exposure Duration (hrs/day)	Dermal dose (mg/kg/day) 4	MOE ⁵
Deciduous Tree (Citrus)	thinning	0.125	0.00028	3000	8	0.0058	200
Tree Nut	harvesting, poling, pruning, thinning	0.114	0.00026	1500		0.0027	500
Fruiting Vegetable	hand harvesting, pruning, staking, tying			1000		0.0018	700
Grape	hand harvest, leaf pulling, thinning, pruning, training/tying			5000		0.0088	150
Root vegetable	hand harvesting			2500		0.0044	280
Cucurbit vegetable	hand harvesting, pulling, leaf thinning, thinning, turning						
Leafy vegetable	harvesting, pruning, thinning						
Soybean	hand harvesting						

¹ Application rates are based on maximum values based on proposed label.

² DFR (mg/cm²) = Dislodgeable Foliar Residues corresponding to day 0. Application Rate (lb ai/A) x CF (4.54E+5 mg/lb) x CF (2.47E-8 A/ cm²) x 20% (initial fraction of ai retained on foliage)

³ TC cm²/hr = Transfer coefficients and associated activities (ExpoSAC Policy Memo #003.1)

⁴ Dermal Dose (mg/kg/day) = DFR (mg/cm²) x TC (cm²/hr) x 8 (hrs/day) x DAF / Body weight (70 kg).

⁵ Dermal MOE = short-term endpoint for dermal (NOAEL 100 mg/kg/day)/Dermal Dose

4.2.6 Spray Drift

Spray drift is always a potential source of exposure to residents nearby to spraying operations. This is particularly the case with aerial application, but, to a lesser extent, could also be a potential source of exposure from the ground application method employed for difenoconazole. The Agency has been working with the Spray Drift Task Force, EPA Regional Offices, and State Lead Agencies for pesticide regulation and other parties to develop the best spray drift management practices. The Agency is now requiring interim mitigation measures for aerial applications that must be placed on product labels/labeling. The Agency has completed its evaluation of the new data base submitted by the Spray Drift Task Force, a membership of U.S. pesticide registrants, and is developing a policy on how to appropriately apply the data and the AgDRIFT computer model to its risk assessments for pesticides applied by air, orchard airblast, and ground hydraulic methods. After the policy is in place, the Agency may impose further refinements in spray drift management practices to reduce off-target drift and risks associated with aerial as well as other application types where appropriate.

6.0 RESIDENTIAL EXPOSURE AND RISK

The proposed new label for use of difenoconazole on turf grass limits application of the product to turf grass on golf courses only. Therefore residential applicator exposure is not assessed for the proposed new golf course turf use. Residential post-application exposure to treated golf course turf is possible for recreational golfers, however. Existing uses also include residential application of difenoconazole to ornamentals.

6.1 Residential Handler Exposure

The term “handler” applies to individuals who mix, load, and apply the pesticide product. There is a potential for exposure to difenoconazole during mixing, loading, and application activities through the dermal and inhalation routes. Difenoconazole products are applied by homeowners using handheld sprayers.

6.1.1 Residential Handler Exposure Scenarios

The following residential handler exposure scenarios evaluated for this assessment are based on information provided in the proposed and existing labels.

- Mixing/loading/applying liquid formulation to ornamentals with hose end sprayer
- Mixing/loading/applying mix-your-own liquid formulation to ornamentals with hose end sprayer
- Mixing/loading/applying liquid formulation to ornamentals with hand held pump sprayer
- Mixing/loading/applying liquid formulation to flower gardens with hose end sprayer
- Mixing/loading/applying liquid formulation to flower gardens with hand held pump sprayer

6.1.2 Residential Handler Exposure Data

No chemical-specific handler exposure data were submitted in support of this registration. When chemical-specific monitoring data are not available, it is HED's policy to use data from the Draft Standard Operating Procedures (SOPs) for Residential Exposure Assessments (December 1997), and updates contained in HED's Science Advisory Council Policy 12 (February 2001).

6.1.3 Residential Handler Exposure Assumptions

- Average body weight of an adult handler is 70 kg.
- Dermal Absorption Factor is 6%
- Exposure duration is short-term (1- 30 days) and intermediate-term (1-6 months)
 - Maximum label application rate is 0.13 lb ai/A for ornamentals and flower gardens
 - Area treated is 0.5 acres per day for handheld sprayer applications to ornamentals and flower gardens

6.1.4 Residential Exposure and Risk Estimates

Exposure and risk estimates indicate MOEs are not of concern (MOEs > 100) at the maximum use rate for the residential post-application exposure scenario assessed. A summary of residential post-application exposure and risk calculations, assumptions, and results is provided in Table 8.

Table 8. Estimated Difenconazole Exposure and MOEs for Residential Handlers Short-Term LOC/MOE = 100										
Exp Scenario	Inhal Unit Exposure (ug/lb ai)¹	Dermal Unit Exposure (mg/lb ai)¹	Appl Rate (lb ai/A)²	Area Treated (A/day)³	Inhal Dose (mg/kg/day)⁴	Inhal MOE	Dermal Dose (mg/kg/d)⁵	Dermal MOE	Agg dose (mg/kg/d)	Agg MOE⁶
Mix/Load/Apply to Ornamentals										
Hose End Sprayer	1.5	39	0.13	0.5	0.0000	900000	0.0022	575	0.0022	575
Hose-end Sprayer Mix Your Own	17	11	0.13	0.5	0.0000	79000	0.0006	2040	0.0006	1988
Handheld Pump Spray	3.8	56	0.13	0.5	0.0000	350000	0.0031	400	0.0031	400
Mix/Load/Apply to Flower Garden										
Hose End Sprayer	0.82	34	0.13	0.5	0.0000	1600000	0.0019	660	0.0019	660
Handheld Pump Spray	2.7	38	0.13	0.5	0.0000	50000	0.0021	590	0.0021	590

¹ Unit exposure values are reported Draft Standard Operating Procedures (SOPs) for Residential Exposure Assessments (December 1997), and updates contained in HED's Science Advisory Council Policy 12 (February 2001)

² Application rates based on labels

³ Amount treated based on information provided ExpoSAC Policy 9

⁴ Inhalation dose (mg/kg/event) = [unit exposure (kg/lb ai) * (1 mg/1000 kg) conversion * appl. rate (lb ai/lbs seed) * Amount treated / body weight (70 kg)].

⁵ Dermal dose (mg/kg/event) = [unit dermal exposure (mg/lb ai) * application rate (lb ai/A) * Amount treated / body weight (70 kg)].

⁶ Agg MOE = NOAEL (1.25 mg/kg/day)/Dermal + Inhalation Daily Dose. The LOC is 100.

6.2 Residential Post-Application Exposure

HED uses the term “post-application” to describe those individuals who can be exposed to pesticides after entering areas previously treated with pesticides and performing certain tasks or activities (also often referred to as reentry exposure).

6.1.1 Residential Post-Application Exposure Scenarios

Dermal post-application exposure was assessed for adult and child recreational golfer. Based on current Agency's practices, a quantitative post-application inhalation exposure assessment was not performed. However, the Agency is in the process of evaluating available data and information on post-application inhalation exposure. If new policies or procedures are put into place based on that evaluation, the Agency may revisit the need for a quantitative occupational post-application inhalation exposure assessment.

6.1.2 Residential Post-Application Exposure Data

Maximum application rates for all of the exposure scenarios assessed are based on information provided in the proposed difenoconazole label for application to golf course turf. The post-application risk assessment is based on generic assumptions from the Recommended Revisions to the Residential SOPs, and recommended approaches by HED' Science Advisory Council for Exposure (ExpoSAC).

6.1.3 Residential Post-application Exposure Assumptions

- Average adult body weight is 70 kg
- Average older child (golfer) body weight is 39 kg
- Dermal absorption factor = 6%
- Exposure is assumed to occur on the day of application (day 0)
- Turf Transferrable residue is 5% of the application rate for the fraction initially available.
- Transfer coefficient is 500 cm²/hour for golfers
- Exposure duration is 4 hours per day for golfers

6.1.4 Residential Post-Application Exposure and Risk

All residential exposures are assessed as short-term based on label prescribed uses. Exposure and risk estimates indicate MOEs are not of concern (MOEs > 100) at the maximum use rate for the residential post-application exposure scenario assessed. A summary of residential post-application exposure and risk calculations, assumptions, and results is provided in Table 9.

Table 9. Estimated Difenconazole Exposure & MOEs for Post-application Dermal Exposure to Treated Lawn/Golf Course Turf LOC/MOE = 100

Exposure Scenario	AR (lb ai/A) ¹	TC (cm ² /hr) ²	Exposure Duration (hrs/day)	Dermal dose (mg/kg/day) ³	Dermal MOE ⁴
Adult Golfers	0.25	500	4	0.00024	5200
Child Golfer		500	4	0.00043	2900

¹ Application rates are based on maximum values based on proposed label.

² TTR or DFR (mg/cm²) = Application Rate (lb ai/A) x CF (4.54E+5 mg/lb) x CF (2.47E-8 A/cm²) x 5% (initial fraction of ai retained on turf)

Application rates are based

³ TC cm²/hr = Transfer coefficients and associated activities (ExpoSAC Policy Memo #003.1)

⁴ Dermal Dose (mg/kg/day) = TTR (mg/cm²) x TC (cm²/hr) x 4 (hrs/day)/70 or 40 kg (body weight)

⁷ Dermal MOE = short-term endpoint for dermal (NOAEL 1.25 mkd)/Daily Dermal Dose



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